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AUTHOR Woodward, Arthur; Elliot, David L.
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ABSTRACT

This study: (1) comprehensively reviews previous research on the treatment of evolution in high school biology textbooks; (2) describes the treatment of evolutionary theory, including mention of creationist explanations of the development of life forms, in the most recent editions of 15 high school biology textbooks from the major publishers; and (3) discusses what the treatment of evolutionary theory in these textbooks indicates about publisher responses to pressure from groups interested in modifying the treatment of evolution (and including non-scientific explanations in science textbooks) and the consequences for educational consumers of such textbook publishing policy. Previous research shows that from 1920 to 1960, the majority of biology textbooks (and those most popular ones) inadequately covered evolution and Darwin or excluded this material. The analysis of the 15 books revealed four patterns of publisher response to the treatment of evolution (from 6 books presenting extensive and uncompromising treatments of evolution to 2 books avoiding the subject). Thus, educators do have a choice when selecting textbooks with respect to evolution. However, it is pointed out that in this situation textbooks have become a statement of value, not of scholarship and pedagogy. (JN)

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Evolution, Creationism, and Textbooks: A Study of Publishers's Perceptions of Their Markets¹

Arthur Woodward and David L. Elliott
EPIE Institute

In June 1982 the Director of Curriculum for New York City's Board of Education informed publishers of three high school biology textbooks that these books had either been removed from the "approved" purchase list or had been refused approved status. These three companies had, according to the curriculum director, either deemphasized or totally eliminated treatment of the theory of evolution and Darwin and had included creationist explanations of development . . ." (that) presents special creation without characterizing it as a supernatural explanation that is outside the domain of science." A spokesperson for Laidlaw Brothers, publishers of one of the affected textbooks responded by stating, "We deleted the term evolution from the textbook because we wanted teachers to be permitted to teach biology without being forced to face controversy from pressure groups. . . . We are developing a supplementary chapter on evolution for this book, and it will be available in the fall for those school districts that want it." (Maeroff, 1982)

This incident in New York City provides a useful point of departure for investigating how publishers perceive their market and then produce textbooks that will fully satisfy it. In the case of New York City, these particular companies clearly misjudged the climate that would have made such textbooks acceptable. In other cases, no such misjudgements presumably occurred and these textbooks will satisfy a particular demand. The questions that this incident inevitably raises are many; How do publishers establish a view of market demand? How do they reconcile what may be inconsistencies between what is academically acceptable and what the public wants? How are controversial issues dealt with? Are publishers overly susceptible to the demands of special interest groups?

Unfortunately, we have little information on which to answer the above questions. Commentators have noted the tendency of publishers to publish similar textbooks and the reduction in choice as the industry becomes dominated by relatively few national publishing companies. (EPIE Institute, 1970) Others have noted the vast development, production and marketing costs of school materials and the consequent need to sell larger quantities of texts if costs are to be covered and profits made. (Brody, 1975) In such a situation the influence of key adoption states and the constituencies that shape their recommendations, the need to sell nationally and offend nobody and publisher's susceptibility to criticism of their products (Reid, 1969; Crane, 1975; Dahlin, 1981) has had profound consequences. Thus, it is not surprising that publishers have attempted to identify, identify with, and sell as many textbooks to the "middle ground" market. Yet, little work has been done that clearly and systematically studies the effect on publishers and their textbooks of these market pressures -- or on the consequences of the publishers search for and perception of their market.

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Arthur Woodward

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The topic of evolution -- and its counterweight creationism -- have been the subject of persistent controversy and pressure. (Nelkin, 1982; Ciolli, 1983) Although widely accepted by the scientific community for many decades and hence a fitting component of any biology course, the theory of the theory of evolution has not been accepted by a relatively small, but vocal section of the population espousing fundamentalist Christian beliefs. Hence, there has been a long-lived and intense campaign to exclude or modify the teaching of evolutionary theory and, more recently, to advocate the teaching of an alternative creationist "theory" of development. (Moore, 1974; Ellis, 1983; Le Clercq, 1974) Such pressure, noted in the 1920s until the present day, has taken many forms and includes state legislation banning the teaching of evolution, judicial actions against teachers, pressure on state adoption committees, and pressure on publishing companies.

By studying the treatment of this highly sensitive topic in high school biology textbooks it should be possible to find out to what extent publishers have modified textbooks that, if following accepted subject matter conventions, would have included an extensive treatment of evolution. In so doing this study should illuminate the ways in which publishers perceive their markets and the consequences that such perceptions have for the publishing industry and for the kind of textbooks that can be published.

The study reported here: (1) Comprehensively reviews previous research on the treatment of evolution in high school biology textbooks. This research shows that from 1920 until 1960 the majority of biology textbooks (and the most popular ones) inadequately covered evolution and Darwin or excluded this material. (2) Describes the treatment of the theory of evolution, including mention of creationist explanations of the development of life forms, in the most recent editions of 15 high school biology textbooks from the major publishers. (3) Discusses what the treatment of evolution theory in these textbooks indicates about publisher responses to pressure from groups interested in modifying the treatment of evolution (and including non-scientific explanations in science textbooks) and the consequences for educational consumers of such textbook publishing policy.

Evolution and Biology Textbooks, 1900-1970

As work of Christy (1937) has shown, the teaching of evolution has been subject to vigorous and sustained opposition. During the early years of the theory the denominational control of many colleges inhibited the acceptance of evolution. Professors of science were discouraged from teaching evolution (and in some cases dismissed for doing so) and as this theory normally would reach high school students through professor-written textbooks and college trained teachers such pressure effectively stifled the teaching of evolution. By the 1920s, agitation against evolution reached fever pitch with colleges dismissing recalcitrant faculty, agitations by fundamentalists against the teaching of evolution in high school biology, and a rash of attempts to introduce legislation in states banning its teaching. Opposition was greatest in Florida, Oklahoma, Texas, Tennessee and Mississippi; in Oklahoma an amendment was added to the free textbook law (1923) forbidding purchase of textbooks that included a treatment of evolution. This was followed by the infamous law enacted in Tennessee in 1925 which forbade the teaching of "any theory that denies the story of the divine creation of man as taught in the Bible" and teaches instead "that man has descended from a lower order of animals" (quoted in Christy, 1937, p. 295) and set the scene for the famous Scopes "monkey" trial.

The Scopes trial, in which William Jennings Bryan battled with Clarence S. Darrow, was (eventually) won on a technicality by the Scopes forces. Yet, the enactment of legislation in Mississippi in 1926 forbidding the teaching of evolution, the referendum-approved anti-evolution law of Arkansas in 1928 and evidence of the dampening effect on the teaching of evolution in more moderate states such as Nebraska (Christy, p 296, 1937) testifies to the effectiveness of anti-evolution pressure.

Anti-evolution pressure had a profound effect on high school biology textbooks. To be sure textbooks were published which included an extensive discussion of evolution, but in the main most textbooks -- and certainly the most widely adopted ones -- took pains to exclude or limit any discussion of evolution. Indeed, studies have shown that textbooks that were originally published with an adequate treatment of evolution drastically changed in succeeding editions -- and thereafter proved to be popular and widely used textbooks. (Cretzinger, 1941; Troost, 1968; Grabiner and Miller, 1974)

Grabiner and Miller's (1974) study of the treatment of evolution in high school biology textbooks from 1910 to 1960 illustrates the effect of anti-evolution sentiment on biology textbooks and their publishers and authors. For although the scientific community forcefully responded to the anti-evolution movement of the 1920s, it assumed that the victory of Scopes was a crushing defeat against their opponents. It was no such thing. Indeed, Grabiner and Miller (1974) have shown that the evolution content of the average high school biology textbook declined after the Scopes trial.

Hunter's Civic Biology (1914) -- the text used by Scopes and which only briefly covered evolution, Gruenberg's Elementary Biology (1919) -- an outspokenly evolutionist textbook, and Moon's Biology for Beginners (1921) which contained a thorough treatment of evolution were, according to Grabiner and Miller, widely used in the 1920s. After the Scopes trial several new textbooks were published including the widely used Smallwood, Revely and Bailey New Biology (1924) which devoted only two pages to evolution, and Gruenberg's new textbook Biology and Human Welfare (1925) which devoted less space to evolution than had its previous version. As Grabiner and Miller note, "The best that can be said for most of the high school biology texts available in 1925 is that the term 'evolution' can usually be found in the index, however minimal the treatment of the subject itself might be." (p. 833) Yet, in the decade following the Scopes trial even mention of evolution in the index or glossary of biology textbooks was infrequent. For example, Hunter's 1926 edition of New Civic Biology omitted discussion of evolution, no longer stressed Darwin's influence on the study of the development of the species and contained no mention of evolution in the index. Moon's Biology for Beginners (1926 edition) no longer contained Darwin's frontispiece photograph and although evolution was adequately treated appropriate religious quotations were scattered through the discussion (by the 1933 edition evolution could not be found in the index and its treatment was severely curtailed).

By the late 1930s more biology textbooks were published that contained treatment of evolution. However, anti-evolution forces still dominated the market and this situation continued until the 1960s. The textbooks of the post-war period to 1960 tended to be revisions of books published before the war. For example, the widely adopted Moon and Mann Biology (1941) and Moon, Mann and Otto Modern Biology

(1947 and numerous editions) placed evolution at the back of the book and did not include the term evolution in the index. Textbooks of lesser popularity, according to work by Labal and Gross (1950), contained little content on evolution. One textbook in particular, Sander's Practical Biology (1947), barely mentioned evolution and implied "a special creation for man and a vitalism of structure and function in living things." (Labal and Gross, p. 397) Skoog's (1969, 1979, 1982) analysis of high school biology textbooks from 1900 to the present generally supports the findings outlined above.

Thus, in spite of the recommendations of a number of prestigious curriculum and scientific committees during the first half of this century, Grobman (1969) noted that, prior to the appearance of the BSCS volumes:

the word "evolution" was not mentioned in most high school biology textbooks. This is not to say that those books did not treat evolution in some fashion, under the guise of organic development or by arranging the animal phyla in a systematic sequence; but evolution as a major embracing theory was not effectively discussed and often was not even identified. (pp. 204-5)

The development of the Biological Sciences Curriculum Study (BSCS) materials -- in which professional biologists played a major part -- included an extensive treatment of evolution. Not surprisingly the BSCS materials faced anti-evolution pressure when they were being field tested, and later when the new BSCS-based textbooks were being considered for adoption, particularly in Texas and Florida. Grobman (1969) noted that by 1969 "the major storms (were) over," and ended on an optimistic note, pointing to the repeal of laws prohibiting the teaching of evolution in every state except Mississippi and to the fact that a number of non-BSCS authors were already "discussing evolution in a far more direct way than had been customary before." The early success of BSCS led Grabiner and Miller (1974) to state:

But 1964 was not 1926; this time the texts were adopted, unexpurgated. Scientists participated in the hearings. The prestige, power, and financial support of the federal government were behind the scientists and the new textbooks. In addition, major historical changes had occurred all militating in favor of the approval of the BSCS books in Texas: the new public interest in improving high school science teaching; the large body of legal precedents limiting religious influence in schools; and the increasing urbanization and educational level of the people of the South. (p. 836)

-- a statement of victory and confidence reminiscent of sentiment following the Scopes trial. But, was that victory a false one?

Post-BSCS Textbooks

Twenty years have elapsed since the first BSCS high school biology textbooks were published. Elapsed, too, is the fervent interest in reforming school programs that prompted federal funding and made possible the teaming of scholars and educators that led to the "new" mathematics, and "new" social studies programs. Indeed, the heady days when the supporters of BSCS were able to defy the state of Texas are long gone. The optimism of Grabiner and Miller (1974) now seems

hopelessly naive as the press reports numerous instances of attempts at banning evolution from biology instruction and attempts to ensure that textbooks exclude evolution and include creationism. After analyzing high school biology textbooks Skoog (1982) found the extensive treatment of evolution in the BSCS textbooks "did not survive the 1970s as the emphasis on selected topics concerned with evolution was drastically reduced or eliminated in some textbooks" and "word changes . . . resulted in many statements becoming less definite, more cautious, and thus less controversial than those appearing in earlier editions." (p. 2) Indeed, he found that the most recent BSCS versions all gave less coverage to evolution than their previous versions. Skoog (1982) succinctly stated the widely held view of the effectiveness of the anti-evolution forces in their efforts to change textbooks:

It seems clear that the past suppression and recent deemphasis of the coverage of evolution in textbooks are mostly a result of strenuous pressures anti-evolutionists have exerted upon publishers, authors, educators, and policymakers. There are no signs that this pressure is weakening or that the movement is localized. Anti-evolutionist groups are present in all parts of this nation and continue to be active. (p. 10)

With the passing of time and passions, school program reforms do tend to become diluted as they become absorbed into the mainstream of the curriculum, with the changing political climate of the country what was acceptable in a biology textbook could be different in the 1980s. By studying textbooks whose content makes them sensitive to social and political pressure it is possible to assess the degree to which publishers have attempted to adjust textbook content to fit their perceptions of the market. By looking at the ways publishers of biology textbooks treat evolution using the extensive treatment of this concept in the BSCS materials as a benchmark, this study will show how different publishers have responded to the conflicting demands of scholarly convention and market demands for modification of subject matter that tones down or eliminates potentially controversial content.

Method

Fifteen of the most recent editions of high school biology textbooks were analyzed for their treatment of the development of life forms on earth. In the analysis the focus was on the content topics, tests and student activities were excluded from analysis. Most of the textbooks examined were from major publishing companies, three were recent revisions of BSCS programs, and all but three had copyright dates of 1980 or later. The analysis of each textbook focused on the following questions:

1. How many pages were devoted to the topic of evolution and related topics? Of these how many were devoted to human evolution?

2. How was the theory of evolution and its supporting evidence described? What subtopics and theorists were included in the description? Were alternative explanations given?

3. What was the textbook authors' point of view regarding the scientist's approach to research in general and the theory of evolution in particular?

The table of contents and index of each textbook was examined to look for the term "evolution," related terms such as "variation and change," and the names of theorists. Pertinent passages in each textbook were then read, a record was made of the subtopics introduced in each chapter and section, and the main thrust of the authors' treatment of the topic was summarized. Analyst reliability was monitored and routinely reached 90%.

Findings

The analysis of the fifteen high school biology textbooks revealed four patterns of publisher response to the treatment of evolution. One group of publishers avoided evolution and Darwin and emphasized alternative explanations of human development. A second group favored a "balanced" approach and took pains to describe both evolutionist and creationist interpretations of development. A third group of publishers chose to present a full description of evolution without covering human evolution. The last group of publishers presented an uncompromising description of all aspects of evolution. These patterns of response reveal that publishers decided to handle the highly controversial topic of evolution quite differently and the path each publisher chose reveals much about how publishing companies attempt to shape their textbooks so that they can sell to the school market.

Publishers avoiding evolution:

Of the fifteen textbooks analyzed only two, those published by Laidlaw (1981) and Addison-Wesley (1980) chose to avoid evolution. Laidlaw's textbook did not mention Darwin (although lesser known scientists were mentioned) and evolution was excluded from the table of contents. Throughout the sections dealing with development there was extensive discussion of various attempts to explain life on earth including the influence of a divine being and spontaneous generation; "In many of these explanations, a "being" or a "force" created living things that have changed very little since they first appeared." (p. 61) Laidlaw's approach seemed to be one of "the verdict is still out" and that evolution (an infrequently used word) was one of many competing theories; "Still another idea -- the one getting the most attention from scientists today -- suggested that life began long ago and was the end result of many chemical reactions." (p. 61) The authors' suggest that students should keep in mind that . . . "these explanations are only ideas. You should not think of these ideas as facts." (p. 61) Inexplicably, the Laidlaw textbook discusses the religious nature of early man and notes that Cro-Magnons (the successors to the Neanderthals) were religious.

In Addison-Wesley's Life Science (1980) evolution is listed in neither the table of contents nor the index. Strangely for a life sciences textbook, the text emphasizes geological history, fossil research and general science information on animals and the environment. Evolution as it relates to humans is not discussed.

Publishers taking the "balanced" approach:

Macmillan's Biology (1981), Scott, Foresman's Biology (1983) and Allyn and Bacon's Biology: An Inquiry Into the Nature of Life (1977) exemplified the comprehensive, but apologetic and tentative approach to the treatment of evolution. In all these textbooks efforts were made to emphasize the uncertainty of scientific prediction and the difficulty of observing and thus "proving" evolution. All three textbooks discuss alternative theories to evolution. Thus, Macmillan's text notes that evolution was a theory (and theories were not facts) not supported by all scientists. The imperfections of the fossil record are highlighted; only a small number of organisms were fossilized and organisms were almost never preserved as whole specimens. And because organisms in swamps and seas were more likely to be fossilized than those in upland or mountain areas the reader is left with the possibility that pre-humans (the likely inhabitants of uplands and mountain areas) may have been excluded from evolutionary development; "The piecing together of the long history of humanity has not been an easy task. Fossil remains are commonly incomplete. There are many ways to interpret the evidence. Much remains to be learned about human history." (p. 279)

Thus, while the Macmillan textbook provided a clear indication of which side it "supports" in the evolutionist-creationist debate; "That organisms do change is a conclusion based on extensive studies of the fossil record as well as existing plants and animals" (p. 231), it does, by emphasizing the inadequacies of fossil evidence and reporting the doubts of some scientists ("This conclusion, however, is not shared by all scientists") (p. 231) give a rather nervous acknowledgement to those who would find unacceptable a textbook that unabashedly supported evolution.

Similarly, Scott, Foresman's Biology (1983) attempted to give a "balanced" presentation. In its section on the origin of life the text paid lip-service to the validity of religious explanations; "Religious answers to questions about the origin of life vary. One common belief is that living things were made by a Divine Being. Since such acts of special creation would be supernatural events, they cannot be tested scientifically." (p. 10) And later the text notes that "Biology deals with the scientific study of life. This means that biologists gain knowledge by using controlled studies to observe and to test natural events. Other ways of knowing about life can be equally valid. But we will deal only with the scientific methods used to learn about life." (p. 10)

Although the textbook provided strong support for evolution-based explanations of development, emphasized the importance of fossil evidence and displayed a chart showing early and later hominids and homo sapiens, that support was consistently qualified by the use of disclaimers and omissions of content. In a chart of the tree of life apes and man were not pictured in the animal section (p. 195), and qualifications such as "the observations of beak structure do not prove evolution" (p. 198), "homology does not prove evolution" (p. 199), and the extensive use of such terms as "seems to" and "suggests" were common. The text thus gives the impression that by emphasizing the tentative nature of the evidence supporting evolution it is leaving open the possibility that other explanations might be valid.

Allyn and Bacon's An Inquiry Into the Nature of Life (1977) perhaps went farther than any other textbook in this group to accommodate the creationist viewpoint while still trying to present mainstream evolutionary content. Thus,

although the text provided extensive coverage of evolution it emphasized that "scientific theories are tentative. They are always subject to discussion and amendment. The wise student will keep an open mind on evolutionary theory until the evidence and the theories themselves have been carefully studied. The student can then make up his or her own mind as to what conclusions are reasonable and acceptable." (p. 84) So anxious does the text seem to be to give a balanced approach that it quoted an appealing and disarming final paragraph from Darwin's The Origin of the Species:

It is interesting to contemplate a tangled bank clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these forms have all been produced by laws acting around us. There is grandeur in this view of life, originally breathed by the Creator into a few forms or into one; and that from so simple a beginning endless forms most beautiful and most wonderful have been and are being evolved. (p. 413)

In addition the textbook described the creationist viewpoint ("a group of scientists and interested laymen have given support to special creation. . . . Leaving aside the religious basis, they assert that creation is adequately supported by scientific evidence" (p. 414) and devotes one page to comparing the creationist and evolutionist positions. Students are told that:

The issue of creation versus evolution concerns you not just as a biology student but as a citizen and prospective voter. You may have to help decide what should be taught in your state and your community. To decide wisely, consider both the evidence presented in this book and evidence that you may gather elsewhere. p. 414.

Publishers excluding human evolution:

In otherwise excellent treatments of evolution all four textbooks in the group: Addison-Wesley's Biology (1978), Cebco Standard's Biology the Study of Life (1983), Holt's Modern Biology (1981) and Globe's Concepts in Modern Biology (1981) avoided discussion of human evolution. The Addison-Wesley textbook firmly discounted special explanations of development with this statement: "In tracing the evolutionary history of the animals, it is tempting to see in the story a guiding hand working out the destiny that ultimately produced humans from the first flatworms. There is no evidence in the fossil records to support such a view." (p. 718) Then it provides a stern primer on scientific method that would put even the most ardent opponent in their place:

The standard by which a theory is judged is its ability to explain the most facts in the simplest manner and to make possible the prediction of new facts. The slowness with which most evolutionary change occurs hampered the theory of evolution in the second respect. In its ability to provide a simple, comprehensive explanation for a vast array of facts, however, the theory of evolution justly stands as the most important theory in biology. Every aspect of the living world that humans study, from biochemistry and cytology to anthropology and history, has been nourished and broadened by it. (p. 558)

Holt's widely used Modern Biology (1981) contained an extensive discussion of evolution. However, the text emphasized tentativeness of evolution by including such statements as, "It is believed that life in the form of living cells first appeared on earth more than three billion years ago." (p. 158) and "The kinds of changes that are believed to have occurred in the past are still going on today." (p. 160) The text also avoided linking humans with primates. Thus, a geological time line showed an advanced human and a monkey, but did not picture early humans or advanced apes. The text did not mention or imply any creationist theories. However, evolution was not included in its index and its chapter on evolution was entitled "Organic Variation."

Globe's Concepts in Modern Biology (1981) strongly defended the theory of evolution and devoted many pages to its discussion. Human evolution was not discussed; one chart showed evolutionary development in which no primates are shown and one early human was shown already using a spear (p. 152).

Publishers of full accounts of evolution:

Of the fifteen textbooks analyzed six contained extensive and uncompromising treatments of evolution; three of these texts were versions of the BSCS materials. The three BSCS textbooks; Houghton Mifflin's Biological Science An Ecological Approach (1982), D.C. Heath's Biological Science a Molecular Approach (1980) and Harcourt's Biological Science An Inquiry into Life (1980), all emphasized the use of scientific method and the sifting of evidence and provided much more background information on evolution than other textbooks. For example, the Harcourt textbook described the development of the theory of evolution, Darwin's contribution, experiments in natural selection and genetic, geographical, biochemical, fossil and other evidence. There was an extensive treatment of genetics, mutation and evolution and population change.

The other textbooks in this group also provided strong support for evolution. Prentice-Hall's Biology and Human Process (1977) clearly stated its position: "Our hypotheses is that our earth was formed from a cloud of dust in space" (p. 404) Prentice-Hall's Biology (1983) provided a thorough account of evolution emphasizing scientific method and evidence. Merrill's Biology Living Systems (1983) also provides extensive coverage of evolution (in contrast to its 1979 edition which avoided human evolution).

Conclusions

It is clear from the above analysis that publishers of the fifteen textbooks analyzed above have adopted different ways of coping with the controversy surrounding evolution. These approaches range from Laidlaw's elimination of evolution from the table of contents and an emphasis on creationist explanations of development to the BSCS derived textbooks that present an uncompromising account of evolution (despite Skoog's 1982 work that suggests that even these textbooks contained less material on evolution than their previous versions). In between these approaches is the apologetic approach of publishers such as Scott, Foresman and Macmillan who attempt to give a "balanced" treatment of creationism and evolution, and Holt's and Globe's textbooks that adequately treat evolution but ignore human evolution.

In many of these textbooks much space was given to an extensive description of scientific inquiry and method as it applied to evolution. Such coverage, which often seemed to verge on defensiveness, provided an excellent insight into how scientific inquiry proceeds, but was limited to evolution; other, less controversial scientific theories apparently did not need such methodological underpinnings.

Despite persistent claims that publishers of biology textbooks are succumbing to creationist pressure and that textbooks are excluding evolution, the above analysis of fifteen textbooks show that each publisher dealt with the controversy surrounding the inclusion of evolution very differently. The result is that educators do have a choice when it comes to selecting textbooks -- at least with respect to how those books deal with evolution. Yet, while this finding is heartening, the actual approach some publishers have decided to take in dealing with evolution raises serious questions about how publishers deal with controversial content. Of the fifteen textbooks analyzed only six thoroughly covered all aspects of evolution. The remaining nine, to varying degrees, compromised their coverage of this topic. Three textbooks did not include human evolution in otherwise excellent treatment of the topic, four attempted to give a "balanced" account of evolution, and two chose to emphasize creationist explanations and/or downplay evolution.

The problem of making such compromises is that they involve an inappropriate and (for the student) confusing perception of subject matter. Within the field of reading it is perfectly defensible, given the state of research and expert opinion, to produce reading basals that reflect different views of reading. Likewise, it is certainly defensible to present competing scientific theories that have been advanced to explain similar physical or biological phenomena. But is it not defensible either to present as science an alternative explanation developed by those who do not accept the standard canons of science or to omit important aspects of a scientific theory because there are groups in the community that disagree.

It is clear that few if any biologists give credence to creationist explanations of development (interestingly, creationists have used testimony from other scientists to support their position, but these scientists have been physicists, chemical engineers and so on). As far as most biologists are concerned evolution, given the tenets of scientific inquiry, provides the most convincing explanation of development. Creationist explanations lacking systematic evidence to support them have to be classified, not as a competing theory or hypotheses, but as mere speculation.

How then do we explain the reaction of publishers? If textbooks are supposed to mirror accepted subject matter conventions, how can publishers include material that has no validity in the scientific community? Like any company, a publisher responds to the laws of supply and demand. Publishers determine what the market is, decide what part of that market they want, and publish their textbooks accordingly. Thus it seems that in publishing, as in many sectors of the economy, market segmentation is taking place. Some publishers will take the "high road," confident that their textbooks will meet the needs of a significant portion of the market; others will pursue a market segment that demands compliance to a political or religious credo; and still others will attempt to satisfy as many segments as possible through carefully orchestrated compromise.

Of course, all the above market strategies would be perfectly acceptable, if publishers did not compromise their representation of subject matter to satisfy the needs of a particular market.² It seems unfortunate that the publishers' perception of their market should be so inordinately influenced by a relatively small segment of opinion. Clearly, a disequilibrium exists between scholarship, community needs and the market. In such a situation textbooks become a statement of value, not of scholarship and pedagogy.

2. Some publishers of biology (and other) textbooks deal with controversial topics by including presentations of competing sides of issues in special sections at the ends of textbook units. This makes it possible to inform students about such issues (without taking sides), while at the same time locating them parenthetically (as it were) in the realm of public policy or religious belief rather than as scientific research.

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